WE CLAIM:

1. An ion beam implanter comprising:

a) an ion beam source for generating an ion beam moving along a beam line;

b) an implantation chamber having an evacuated interior region wherein a workpiece is positioned to intersect the ion beam for ion implantation of an implantation surface of the workpiece by the ion beam; and

c) workpiece support structure coupled to the implantation chamber and supporting the workpiece, the workpiece support structure including:

1) a chuck for holding the workpiece, the chuck including a rotatable pedestal supporting the workpiece;

2) a first rotatable reel coupled to and rotatable with the pedestal;

3) a flexible, hollow cord coupled to the first rotatable reel such that, as the pedestal is rotated in a first direction, a length of the flexible cord wrapped around the first reel increases and, as the pedestal is rotated in an opposite direction, a length of the flexible cord wrapped around the first reel decreases; and

4) facilities including at least one of a coolant line carrying coolant to the chuck and an electrical power conductor conducting electrical power or control signals to the chuck, at least a portion of the at least one of the coolant line and the electrical power conductor being routed through an interior of the cord.

2. The ion beam implanter of claim 1 wherein the workpiece support structure further includes a drive including a rotatable member operatively coupled to the chuck for rotating the pedestal.

3. The ion beam implanter of claim 2 wherein the workpiece support structure further includes a second rotatable reel coupled to and rotatable with the rotatable member of the drive, the cord extending between the first and second rotatable reels and coupled to the second rotatable reel such that, as the pedestal is rotated in the first direction, a length of the flexible cord wrapped around the second reel increases and, as the pedestal is rotated in the opposite direction, a length of the flexible cord wrapped around the second reel decreases.

4. The ion beam implanter of claim 3 wherein the rotatable member of the drive includes a drive pulley and the chuck includes a driven pulley coupled to the pedestal and a drive belt extends between the drive and driven pulleys to rotate the pedestal when the drive rotates the drive pulley.

5. The ion beam implanter of claim 4 wherein the first reel is coupled to the driven pulley and the second reel is coupled to the drive pulley.

6. The ion beam implanter of claim 1 wherein the facilities include both the coolant line carrying coolant to the chuck and the electrical power conductor conducting electrical power or control signals to the chuck and further including a first connector assembly near an end of the cord attached to the first reel, the first connector assembly including a first fluid connector to which the coolant line is coupled to permit fluid flow to the chuck and a first electrical connector to which the electrical power conductor is coupled to permit conduction of electrical power or control signals to the chuck.

7. The ion beam implanter of claim 3 wherein the facilities include both the coolant line carrying coolant to the chuck and the electrical power conductor conducting electrical power to the chuck and further including a second connector assembly near an end of the cord attached to the second reel, the second connector assembly including a first fluid connector to which the coolant line is coupled to permit fluid flow to the chuck and a first electrical connector to which the electrical power conductor is coupled to permit conduction of electrical power or control signals to the chuck.

8. The ion beam implanter of claim 6 wherein the coolant line includes a first fluid coolant line for routing cooling fluid to the chuck and a second gas coolant line for routing heat transfer gas to the chuck and the first connector assembly includes first and second fluid.

9. The ion beam implanter of claim 4 wherein the workpiece support structure includes a scan arm that supports the chuck, the scan arm defining an interior region at atmospheric pressure, the first and second rotatable reels, the cord and the drive and driven pulleys are disposed within the scan arm interior

region.

10. The ion beam implanter of claim 4 wherein a hollow vacuum seal is disposed between the driven pulley and the chuck to provide a seal between the ion implantation chamber interior region and the scan arm interior region, the vacuum seal defining a central opening through which a portion of the facilities are routed to the chuck.

11. The ion beam implanter of claim 1 wherein the chuck is an electrostatic chuck and the workpiece is held on the pedestal by electrostatic force.

12. The ion beam implanter of claim 1 wherein the workpiece support structure includes a rotation member coupled to the implantation chamber for changing an implantation angle of the workpiece with respect to a portion of the ion beam within the implantation chamber and a translation member disposed within the implantation chamber and movably coupled to the rotation member, the translation member supporting the chuck and the workpiece for movement along a linear path of travel.

13. An ion beam implanter comprising:

a) an ion beam source for generating an ion beam moving along a beam line;

b) an implantation chamber having an evacuated interior region wherein a workpiece is positioned to intersect the ion beam for ion implantation of an implantation surface of the workpiece by the ion beam; and

c) workpiece support structure coupled to the implantation chamber and supporting the workpiece, the workpiece support structure including:

1) a chuck for holding the workpiece, the chuck including a rotatable pedestal supporting the workpiece;

2) a drive including a rotatable member operatively coupled to the chuck for rotating the pedestal;

3) a first rotatable reel coupled to and rotatable with the pedestal;

4) a second rotatable reel coupled to and rotatable with the rotatable member of the drive;

5) a flexible, hollow cord extending between and coupled to the first and second rotatable reels such that, as the pedestal is rotated in a first direction, a length of the flexible cord wrapped around the first reel increases and a length of the flexible cord wrapped around the second reel decreases and, as the pedestal is rotated in an opposite direction, a length of the flexible cord wrapped around the first reel decreases and a length of the flexible cord wrapped around the second reel increases; and

6) facilities including at least one of a coolant line carrying coolant to the chuck and an electrical power conductor conducting electrical power to the chuck, at least a portion of the at least one of the coolant line and the electrical power conductor being routed through an interior of the cord.

14. A workpiece support assembly for an ion beam implanter generating an ion beam moving along a beam line and including an implantation chamber wherein a workpiece is positioned to intersect the ion beam for ion implantation of an implantation surface of the workpiece by the ion beam, the workpiece support assembly comprising:

a) a chuck for holding the workpiece, the chuck including a rotatable pedestal supporting the workpiece;

b) a first rotatable reel coupled to and rotatable with the pedestal;

c) a flexible, hollow cord coupled to the first rotatable reel such that, as the pedestal is rotated in a first direction, a length of the flexible cord wrapped around the first reel increases and, as the pedestal is rotated in an opposite direction, a length of the flexible cord wrapped around the first reel decreases; and

d) facilities including at least one of a coolant line carrying coolant to the chuck and an electrical power conductor conducting electrical power to the chuck, at least a portion of the at least one of the coolant line and the electrical power conductor being routed through the cord.

15. The workpiece support assembly of claim 14 further including a drive including a rotatable member operatively coupled to the chuck for rotating the pedestal.

16. The workpiece support assembly of claim 15 further including a second rotatable reel coupled to and rotatable with the rotatable member of the drive, the cord extending between the first and second rotatable reels and coupled to the second rotatable reel such that, as the pedestal is rotated in the first direction, a length of the flexible cord wrapped around the second reel increases and, as the pedestal is rotated in the opposite direction, a length of the flexible cord wrapped around the second reel decreases.

17. The workpiece support assembly of claim 16 wherein the rotatable member of the drive includes a drive pulley and the chuck includes a driven pulley coupled to the pedestal and a drive belt extends between the drive and driven pulleys to rotate the pedestal when the drive rotates the drive pulley.

18. The workpiece support assembly of claim 17 wherein the first reel is coupled to the driven pulley and the second reel is coupled to the drive pulley.

19. The workpiece support assembly of claim 15 further including a first connector near an end of the cord attached to the first reel, the first connector providing for a fixed connection between the portion of the least one of the coolant line and the electrical power conductor routed through the cord and at least one of a section of a coolant line extending from the chuck to the first connector and a section of electrical power conductor extending from the chuck to the first connector.

20. The workpiece support assembly of claim 16 further including a second connector near an end of the cord attached to the second reel, the second connector providing for a fixed connection between the portion of the least one of the coolant line and the electrical power conductor routed through the cord and at least one of a section of a coolant line extending from outside the implantation chamber to the second connector and a section of electrical power conductor extending from outside of the implantation chamber to the second connector.

21. The workpiece support assembly of claim 20 wherein the rotatable member of the drive includes a hollow shaft and the at least one of a section of a coolant line extending from outside the implantation chamber to the second connector and a section of electrical power conductor extending from outside of the implantation chamber to the second connector extends through the hollow shaft and is coupled to the second connector.

22. The workpiece support assembly of claim 17 further including a scan arm that supports the chuck, the scan arm defining an interior region at atmospheric pressure, the first and second rotatable reels, the cord and the drive and driven pulleys are disposed within the scan arm interior region.

23. The workpiece support assembly of claim 22 wherein a hollow vacuum seal is disposed between the driven pulley and the chuck to provide a seal between the ion implantation chamber interior region and the scan arm interior region, the vacuum seal defining a central opening through which a portion of the facilities are routed to the chuck.

24. The workpiece support assembly of claim 14 wherein the chuck is an electrostatic chuck and the workpiece is held on the pedestal by electrostatic force.

25. The workpiece support assembly of claim 14 further including a rotation member coupled to the implantation chamber for changing an implantation angle of the workpiece with respect to a portion of the ion beam within the implantation chamber and a translation member disposed within the implantation chamber and movably coupled to the rotation member, the translation member supporting the chuck and the workpiece for movement along a linear path of travel.

26. An ion beam implanter comprising:

a) an ion beam source for generating an ion beam moving along a beam line;

b) an implantation chamber having an evacuated interior region wherein a workpiece is positioned to intersect the ion beam for ion implantation of an implantation surface of the workpiece by the

ion beam; and

c) workpiece support structure coupled to the implantation chamber and supporting the workpiece, the workpiece support structure including:

1) a chuck for holding the workpiece, the chuck including a rotatable pedestal supporting the workpiece;

2) a drive including a rotatable member operatively coupled to the chuck for rotating the pedestal;

3) a first rotatable reel coupled to and rotatable with the pedestal;

4) a flexible, hollow cord coupled to the first reel such that, as the pedestal is rotated in a first direction, a length of the flexible cord wrapped around the first reel increases and, as the pedestal is rotated in an opposite direction, a length of the flexible cord wrapped around the first reel decreases; and

5) facilities including at least one of a coolant line carrying coolant to the chuck and an electrical power conductor conducting electrical power to the chuck, at least a portion of the at least one of the coolant line and the electrical power conductor being routed through an interior of the cord.

27. The ion beam implanter of claim 26 wherein the workpiece support structure further includes a second rotatable reel coupled to and rotatable with the rotatable member of the drive, the flexible cord coupled to the second reel such that, as the pedestal is rotated in the first direction, a length of the flexible cord wrapped around the second reel decreases and, as the pedestal is rotated in the opposite direction, a length of the flexible cord wrapped around the second reel increases.

28. The ion beam implanter of claim 27 wherein rotatable member of the drive includes a drive pulley and the chuck includes a driven pulley coupled to the pedestal and a drive belt extends between the drive and driven pulleys to rotate the pedestal when the drive rotates the drive pulley.

29. A workpiece support assembly for an ion beam implanter generating an ion beam moving along a beam line and including an implantation chamber wherein a workpiece is positioned to intersect the

ion beam for ion implantation of an implantation surface of the workpiece by the ion beam, the workpiece support assembly comprising:

a) a chuck for holding the workpiece, the chuck including a rotatable pedestal supporting the workpiece;

b) a drive including a rotatable member operatively coupled to the chuck for rotating the pedestal;

c) a first rotatable reel coupled to and rotatable with the pedestal;

d) a flexible, hollow cord coupled to the first reel such that, as the pedestal is rotated in a first direction, a length of the flexible cord wrapped around the first reel increases and, as the pedestal is rotated in an opposite direction, a length of the flexible cord wrapped around the first reel decreases; and

e) facilities including at least one of a coolant line carrying coolant to the chuck and an electrical power conductor conducting electrical power to the chuck, at least a portion of the at least one of the coolant line and the electrical power conductor being routed through the cord.

30. The workpiece support assembly of claim 29 further including a second rotatable reel coupled to and rotatable with the rotatable member of the drive, the flexible cord coupled to the second reel such that, as the pedestal is rotated in the first direction, a length of the flexible cord wrapped around the second reel decreases and, as the pedestal is rotated in the opposite direction, a length of the flexible cord wrapped around the second reel increases.

31. The workpiece support assembly of claim 30 wherein rotatable member of the drive includes a drive pulley and the chuck includes a driven pulley coupled to the pedestal and a drive belt extends between the drive and driven pulleys to rotate the pedestal when the drive rotates the drive pulley.

32. The ion beam implanter of claim 2 wherein the drive is a direct drive servo motor coupled to the pedestal.

33. The workpiece support assembly of claim 15 wherein the drive is a direct drive servo motor coupled to the pedestal.